ABSTRACT

The present invention relates to the design and manufacture of single cell units for planar, thin-film, ceramic electrochemical devices such as solid oxide fuel cells, electrochemical oxygen generators, gas separation membranes, and membrane modules and stacks and the fabrication of multi-cell stacks and modules of the single cell units. The design is based upon a single cell wherein manufacturing all layers of the device into an integral unit produces a monolithic structure. The design produces a gas-tight single cell that is easily assembled into multi-cell stacks and modules without external seals or sealing mechanisms. The design may use standard ceramic and metallurgical production techniques. The design of the present invention enhances device performance since the single cell units are inherently sealed for gas tightness and have reduced interfacial electrical resistances. All these features of the novel monolithically integrated unit cell design result in lower manufacturing costs for ceramic electrochemical devices.